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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/796,656

03/09/2004

Yoshitaka Hamada

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EXAMINER

SMOOT, STEPHEN W

ART UNIT

PAPER NUMBER

2813

DATE MAILED: 09/26/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/796,656	<b>Applicant(s)</b> HAMADA ET AL.	
	<b>Examiner</b> Stephen W. Smoot	<b>Art Unit</b> 2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 24 July 2006.
- 2a) ☐ This action is **FINAL**.      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 5 is/are allowed.
- 6) ☒ Claim(s) 1,2,4,6-10,12 and 13 is/are rejected.
- 7) ☒ Claim(s) 3 and 11 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
- ☒ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

This Office action is in response to applicant's amendment and to applicant's declaration under 37 CFR 1.132 filed on 24 July 2006.

### ***Response to Amendment***

1. The declaration under 37 CFR 1.132 filed on 24 July 2006 is sufficient to overcome the rejection of claims 3, 5, 11 based upon unexpected results obtained when the trialkylmethylammonium used in the composition (claim 3), the method (claim 5), and the semiconductor device (claim 11) includes a reaction product of trialkylamine and dimethyl carbonate. The unexpected results are that, regarding claim 5, a purified composition can be formed without the additional steps of washing with water and that, regarding claims 3, 11, deposited films of the as claimed composition have improved mechanical properties in comparison to films formed from the "washed" composition.

***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-2, 4, 6-10, 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kurosawa et al. (US 6,410,150 B1) in view of applicant's admitted prior art (see specification, paragraph bridging pages 3-4).

Referring to column 17, lines 31-42 and column 18, lines 17-26, Kurosawa et al. disclose a composition that is prepared by hydrolysis and condensation of a mixture of methyltrimethoxysilane and tetraethoxysilane using tetramethylammonium hydroxide as a catalyst. The methyltrimethoxysilane is the as-claimed formula (3), wherein Z is methoxy (an alkoxy group with one carbon) and R is methyl (a hydrocarbon group with one carbon), the tetraethoxysilane is the as-claimed formula (4), wherein Z is ethoxy (an alkoxy group with two carbons), and the tetramethylammonium hydroxide catalyst is the as-claimed formula (5), wherein R is methyl (an alkyl with one carbon). These are structural limitations set forth in claim 1 of the applicant's invention.

Regarding claims 8-9, 13, Kurosawa et al. further disclose that the film can be used as interlayer insulating films for semiconductor devices and, more specifically, that

Art Unit: 2813

the insulating film can be interposed between metallic wirings (see column 16, lines 4-17).

However, Kurosawa et al. lack the limitations of independent claims 1, 9, wherein the composition includes 10 ppm or less halogen impurity and 100 ppb or less boron plus metallic impurity.

The applicant's admitted prior art (see paragraph bridging pages 3-4) indicates that a conventional composition obtained by hydrolysis and condensation of alkoxysilane includes a significant amount of metallic and halogen impurities. Further, the applicant states: "additional numerous steps are required to remove the impurities" (page 4, lines 13-14), which implies that it is known in the art to remove the impurities through further processing. The applicant's declaration under 37 CFR 1.132 filed on 24 July 2006, indicates that the additional numerous steps are washing with ultrapure water (reference example 1 and reference example 2) and shows comparable purity levels of the "washed" compositions in comparison to the purity levels of compositions obtained when purified tetramethylammonium hydroxide (example 1) and purified triethylmethylammonium hydroxide (example 2) are used (see declaration, Table 3).

Therefore it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teachings of Kurosawa et al. with the applicant's admitted prior art in order to remove metallic and halogen impurities from the composition of Kurosawa et al. through further processing, because the applicant indicates that removal of such impurities is required by incorporating known additional process steps (see page 4, lines 9-14).

Art Unit: 2813

Regarding claim 2, the catalyst is used for the hydrolysis and condensation of the alkoxysilanes, and is not part of the resulting composition. Accordingly, the limitation of claim 2 featuring the trialkyl component of the catalyst having 4 to 15 carbons, is a process limitation that would yield a composition that is not distinguishable from the above composition of Kurosawa et al. Per MPEP section 2113, the burden is now shifted to the applicant to show an unobvious difference between their composition as claimed in claim 2 and the composition of Kurosawa et al., since these compositions are believed to be substantially identical.

Regarding claim 4, the weight average molecular weight of the above composition disclosed by Kurosawa et al. is 1,000,000 (see column 18, lines 20-24).

Regarding claims 6-7, Kurosawa et al. further disclose coating a silicon wafer with the above composition, drying the film at 80 degrees C and at 200 degrees C, and heating the dried film at 340 degrees C, 360 degrees C, 380 degrees C, and 400 degrees C to form a film (see column 19, line 42 to column 20, line 3). It is implicit from the disclosure of Kurosawa et al. that the resulting film is porous because they disclose a density of  $1.3 \text{ g/cm}^3$  (see Table in column 20).

Regarding claim 10, the catalyst is used for the hydrolysis and condensation of the alkoxysilanes, and is not part of the resulting semiconductor device. Accordingly, the limitation of claim 10 featuring the trialkyl component of the catalyst having 4 to 15 carbons, is a process limitation that would result in a semiconductor device that is not distinguishable from the above semiconductor device of Kurosawa et al. Per MPEP section 2113, the burden is now shifted to the applicant to show an unobvious

Art Unit: 2813

difference between their semiconductor device as claimed in claim 10 and the semiconductor device of Kurosawa et al., since these products are believed to be substantially identical.

Regarding claim 12, the weight average molecular weight of the above composition disclosed by Kurosawa et al. is 1,000,000 (see column 18, lines 20-24).

### ***Allowable Subject Matter***

4. Claim 5 is allowed.

5. Claims 3, 11 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form to include all of the limitations of the base claim and any intervening claims.

### ***Response to Arguments***

6. Applicant's arguments, see page 8-10, filed 24 July 2006, with respect to the rejection of claims 1-2, 4, 6-10, 12-13 under 35 USC 102 (b) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground of rejection is made in view of Kurosawa et al. and applicant's admitted prior art.


**Conclusion**

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen W. Smoot whose telephone number is 571-272-1698. The examiner can normally be reached on M-F (8:00 am to 4:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr. can be reached on 571-272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

SWS

  
**STEPHEN W. SMOOT**  
**PRIMARY EXAMINER**